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THE PHYSIOLOGICAL BASIS OF RELATIONAL PROCESSES.

BY PROFESSOR MARGARET FLOY WASHBURN,
Vassar College.

The recent attempts at experimental investigation of thought processes, and the widespread tendency towards the recognition of 'non-sensory' elements as essential components in experience, suggest a number of interesting problems with regard to the classification and placing of these elements in psychological systems. It is impossible not to recognize that much of what goes on in our minds cannot be described, as a result of direct introspection, in terms of sensations. The 'Bekanntheitsqualität' may be accompanied by muscular relaxation, but it certainly is not a complex of muscular and strain sensations in the same sense that a chord is a fusion of tone sensations. The consciousness of the incompatibility of two statements appears to be an experience which, if analyzable at all, is not by immediate introspection reducible to a group of sensations whose members can be identified and localized. And yet there are two reasons, at least, why it would be desirable, if the thing could be done, to make sensory processes the all-sufficient components of such experiences.

The first reason is that in just such experiences as familiarity, contradiction, and the like, even ordinary introspection reveals sensational elements intimately involved, at least, — half fused, as it were, with the total experience, which declines to get on without them and yet declines to fall apart and resolve itself into nothing else. Familiarity is so nearly, and yet not quite, a relaxed and comfortable bodily attitude, describable in terms of muscular and organic sensations; contradiction is almost, yet not quite, the bodily sensations arising from the inhibition of a movement partly initiated, as when we start to act on one statement but are brought up short by the thought of the con-

tradictory one. And if the Wundtian solution be adopted, and we find in 'feelings' of strain, relaxation, excitement, and so on, with their combinations, the psychic material that is needed to supplement sensations, here also a good case may be made on purely introspective grounds for identifying, at least partially, these 'feelings' with complexes of organic and muscular sensations; strain and relaxation involving rather the latter, excitement and depression including also the former. In a word, introspection reveals the relational processes as partly reducible, and partly irreducible, to sensory components. They are so nearly sensory that it is no wonder we are tempted to think that better introspective analysis would make them wholly so.

The other reason why some of us would be glad, if possible, to bring about such a result is physiological. The fact is that the one physiological process upon which we can really rely, which we really know, as an antecedent of change in consciousness, is the process initiated in a sensory nerve ending. We have a reasonable assurance that the appearance of the color red in our minds is connected with an excitation process in the optic nerve. We can hazard certain fairly plausible conjectures as to what physiological process underlies a reproduced or 'centrally excited' red. Other changes in consciousness, like those produced in association and attention, must apparently be due to processes wholly within the brain, but unfortunately of the nature of those processes we know almost nothing. Not only are the externally initiated afferent changes in the nervous system those whose nature is most familiar to us, if one can speak of familiarity where so much is obscure, but they are also the oldest, phylogenetically. The development of the peripheral nervous system precedes that of the central nervous system. In so far, then, as we can reduce our developed and complex human mental processes to sensory components, thus far do we succeed in finding a fairly solid and ancient physiological basis for them. Otherwise, we are driven to hypotheses such as that the outgoing nervous process is itself accompanied by specific mental modifications, or that peculiar psychic states accompany excitations in 'association fibers'; hypotheses made as it were out of whole cloth.

Is it then possible to solve the puzzle of these refractory constituents of experience by admitting that they are not, for immediate introspection, sensational, while yet holding that the physiological processes underlying them are of the ordinary sensory type? I think that it is. But before proceeding to consider how such a solution can be reached, a few remarks on the conditions governing psychological analysis may not be out of order. One great source of

the lack of unanimity in psychological theorizing at the present time is lack of agreement as to the conditions under which the definitive analysis and description of a mental process shall take place. For example, it is obviously necessary to choose between the analysis of a process during its immediate experience, and its analysis by later reflection, that is, by reviving the process after it has run its course. To take a well-worn example, an emotion is analyzed into a fusion of organic and kinæsthetic sensations, but obviously the emotion as directly experienced would not be described by the subject as a fusion of sensations at all. For him it is an absorbing and unanalyzable moment of experience: it is only by calling up a weakened reproduction of the emotion that he can recognize, post mortem, the actual significance for it of the organic and kinæsthetic sensations. Most of us, however, would agree that the final and authoritative description of a mental process is that based on subsequent, not on immediate, analysis. Again, we may ask whether the definitive description of mental processes is to rest their analysis when in the focus of consciousness, or whether we may include among the products of our final analysis certain bits of experience found only in the marginal regions. This is a point which needs further discussion. There are, in fact, two senses in which the word 'marginal' may be used. One of them is the familiar application of the word to whatever is in consciousness but is not at a given moment attended to, although it may be as soon as attention is 'turned' to it. For instance, the sound from an electric fan in the next room was, until just now, 'marginal' to my consciousness in this sense: at any moment I might have attended to it, as I am doing now, and when I attend to it, and it ceases to be marginal, I can distinguish in the sound elements of tone and noise, I can roughly identify the pitch of the tone elements, and so on. It is clear that when 'marginal' is taken in this sense, the question as to whether the final analysis of mental processes must necessarily be only of focal processes answers itself: of course no process is analyzed unless it is attended to, and if it is marginal in the sense of not being attended to, it is not susceptible of any adequate description.

But another possible meaning of the term 'marginal' may be thus illustrated. A chance remark of a friend suggests to me something that I have recently read, yet I cannot recall more than the vaguest aura of the substance of that something. It is not because I am inattentive to the aura that it does not develop itself further: I am giving it the most painful attention; it is 'focal' in the sense of pushing aside every other consideration for the time being, yet in another sense

it remains persistently marginal. It will not come. The reasons for the indistinctness in which the sound of the fan remained are apparently different from those which condemn the half-recalled idea to obscurity. In the former case the laws governing attention are responsible for the insufficient clearness; the sound of the fan is marginal because it is monotonous and unconnected with any process already focal. In the case of the idea, the process of association is blocked for the time being so far as the idea needed is concerned. Evidently, however, to say that the failure in the first case is one of attention and in the second case one of association is to ignore the intimate relation of attention and association to each other. It was really a process of association that rescued the sound of the fan from the marginal region of my consciousness just now; I was looking for an illustration and the whirring noise from the next room 'suggested itself.' It had been marginal previously partly because no associative process had led in its direction. The forgotten idea, on the other hand, is still marginal, because the processes of association leading in its direction are for some occult reason not strong enough to produce it. We might use the term '*obstructed*' to designate mental processes in the condition of this idea: the obscurity of an obstructed process may be only temporary, like that of a marginal process in the ordinary sense, but something more than the mere 'turning' of attention in its direction is necessary to remove the obscurity.

Now the question whether definitive analysis and description of mental processes is to include *obstructed* processes is one bearing directly on the main subject of the paper. In reading the introspections of Bühler's subjects, for example, one feels sure that some, at least, of the non-sensational elements discovered by them are precisely such 'fallings from us, vanishings' as represent in my present consciousness the refractory idea I am in search of; that they are processes which for the time being are obstructed, but which may on some other occasion emerge into clearness and prove to be complexes of sensational elements.[1] Because they are temporarily non-sensational, must we class them as permanently so?

If we need to distinguish sharply in our psychological analysis between processes which are temporarily non-sensory and those which are permanently so, we need equally to distinguish between 'sensory' as applied to mental processes which have *for introspection* a certain character, and the same term applied to mental processes whose *physio-*

[1] Cf. von Aster's criticism that the introspections of Bühler's observers confuse '*Kundgabe*' with '*Beschreibung*,' *Zeit. f. Psych.*, Vol. 49, p. 57.

logical substrate is the excitation of sensory centers, by either of the two ordinary methods of such excitation, the stimulation of an afferent nerve or the transfer of energy from another cortical center. My vaguely recalled idea which refuses to develop itself is, while obstructed, non-sensory in the first meaning. I cannot analyze it, I cannot say whether its components are visual or auditory or kinæsthetic. Yet it may later develop into a perfectly definite and analyzable mental picture, revealing clearly identified sensory components. Am I not justified in thinking that on the physiological side it was sensory even in the obstructed state; that the sensory components it reveals when fully developed were represented in the obstructed state by ordinary sensory nervous processes, which for some reason were not being allowed to reach their full intensity? In other words, some, at least, of the elements in the obstructed processes may be based on ordinary sensory processes in the nervous system, and yet not reveal themselves to introspection as sensations. This is obviously the case with sensations that are not attended to, that is, not introspected at all, but they may be so readily invested with their full sensational character, localized, discriminated as to quality and intensity, that there is no danger of classing them as finally non-sensory, a danger which seems to exist for the obstructed processes.

Now if it is possible for processes that are through some obscurely caused inhibition prevented from entering into full consciousness even though they are in the focus of attention, to be based on sensory physiological processes while non-sensory to introspection, *is it not possible that certain mental contents which never, under any circumstances, fully reduce themselves for introspection to sensation complexes, may yet be wholly sensory in their physiological accompaniments?* My vague inkling of a nearly forgotten name is unanalyzable into auditory and kinæsthetic sensations, yet a few minutes later it may develop into a perfectly analyzable sensation complex: surely I may suppose that the physiological substrate of the 'inkling' was not different in character, only in degree, from that of the fully remembered name. The 'feeling of contradiction,' on the other hand, remains permanently irreducible to sensation elements, even though it has certain characteristic accompanying sensations. Yet may it not be that the nervous process underlying the feeling of contradiction is not a new kind of nervous process, involving association fibers, for instance, but simply a fusion of processes in cortical sensory cells, whose mental accompaniment remains permanently simple? Everyone knows, of course, that psychological analysis and physiological

analysis need not run parallel; that the nervous correlate of a simple mental content may be itself a highly organized combination, since mental analysis has evolved under conditions not identical with those which are responsible for simplicity and complexity in the nervous system. May not, then, a 'relational element' be based physiologically on an organization of sensory processes of the ordinary type?

It is quite evident that if this should be proved possible, it would not eliminate relational elements as unique constituents of conscious experience. If a process is never, under the most favorable circumstances, analyzable by introspection, then that process must remain for psychology unique and elementary. If it is not for introspection a sensational process, that is, if it cannot be localized and referred to one of the great sensation classes, then we cannot say that sensations are all-sufficient components of experience. But although proof that the nervous processes underlying relational elements are of the ordinary sensory type would not reduce these elements, as conscious phenomena, to sensations, it would nevertheless do important service. It would remove the necessity for finding a physiological basis for relational processes in modes of nervous activity which are not known to have any immediate conscious accompaniment, and it would make conceivable a genetic affiliation between sensations and relational processes: it would give them a common physiological ancestry.

Now of course it is utterly out of the question with our present resources to prove the nature of the physiological correlate of any mental process: it is only, as we have seen, in the case of sensations that we have any approach to definite knowledge on the subject. But one pertinent question may be asked of the person who wishes to maintain that relational processes are on the physiological side sensory in character. A suggestion may reasonably be demanded as to *what kind of sensory processess have fused to form the basis of these introspectively non-sensory contents?* And to this question it seems to me that the answer most likely to be true is: kinæsthetic sensory processes.

The least weighty reason leading to this answer is that all the other sense-classes, except the closely associated group of organic sensations, seem obviously unavailable. Since the relational processes are experienced in connection with every kind of external object, actually perceived or recalled in idea, we cannot think of them as inseparably connected with any single class of sensory excitations coming from outside stimuli, such as those of sight, smell or hearing. But of course this is taking for granted that their basis is sensory at

all, an hypothesis which we hoped to support by presenting kinæsthetic processes as eligible candidates for the office of their physiological representative. We may pass then to a second consideration. The most important, at least, of the relational processes may be described from one point of view as 'attitudes.' Contradiction, for instance, certainly often involves a kind of hesitation: we assume that a certain statement is true, that is, we prepare to act upon it, *but* a possibility arises which is contradictory, that is, which demands an opposite course, and our tendencies to act remain balanced. Expectation, the hypothetical and conditional 'feelings,' familiarity, all certainly imply typical motor states, which must mean typical kinæsthetic sensory excitations. It is not unnatural to suppose that while some of these sensory excitations produce kinæsthetic sensations that can be distinguished and identified by introspection, others may be so fused that their results on the psychic side form the unanalyzable relational process. This of course simply reverts to the point mentioned above: if kinæsthetic sensations are the most characteristic accompaniment of relational processes, why may not kinæsthetic excitations, more closely fused, be the basis of the relational element itself?

But another question that demands attention is, thirdly, regarding the *probability* of such a fusion of kinæsthetic excitations to form the basis of relational processes. Broadly speaking, there are at least two principles that determine whether several sensory excitations, affecting consciousness simultaneously, shall produce a mental process that is introspectively unanalyzable or one in which the results of the various excitations can be distinguished as separate components. In the first place, the older the association of the excitations in question, the more frequently they have affected the organism at one and the same time, the more their psychic accompaniments tend to fuse. In the second place, mental analysis is, like everything else connected with the organism, a product of necessity and adaptation. The different factors of our conscious experience have been subjected to the amount and kind of analysis that they have most needed. Analysis has developed where it would do the most good; for instance, organic sensations have from a practical point of view needed little analysis, and they have had little; contact stimulation has needed local rather than qualitative analysis, and it has developed the one at the expense of the other. It is unnecessary to point out that these two principles, that of frequency of association and that of adaptation to needs, are not coördinate and independent, nor is it necessary here to discuss their intimate relations. The point I wish to emphasize is this: can it be

shown on the one hand that the fusion of kinæsthetic sensory processes which we have conjectured as the basis of relational mental processes is a fusion based on the frequency with which the sensory excitations have been associated? And on the other hand, can we find reasons why, from an adaptive point of view, analysis of the conscious effect of kinæsthetic excitations beyond a certain point has been unnecessary and undesirable? Both of these questions, it seems to me, may be answered in the affirmative.

As regards the first, if the physiological basis of those components of relational processes which remain permanently non-sensory is a fusion of sensory processes resulting from an 'attitude' of the organism, then, in order that this fusion shall be so close, the attitudes involved must be phylogenetically very old. The ideal method of reasoning here would consist in naming all the elementary relational processes, and showing that each one of them requires a distinct and ancient attitude, so firmly implanted in the organism that the afferent impulses it produces result in an unique and unanalyzable psychic content. But this method unfortunately cannot be followed. Psychological opinion with regard to the number and classification of relational processes is in an absolutely chaotic state: logical and psychological motives are hopelessly intermingled in its discussion, and if I were to give my own enumeration and grouping of those processes, which I am by no means ready to do, it would take the rest of my space to explain and justify it. The best that can be done is to point out that the most important and generally accepted relational processes, such as the 'feelings' of likeness, difference, opposition, conditional dependence, do represent attitudes of the organism that are very old indeed. As soon as an animal capable of making more than one kind of response to external stimuli was evolved, the nature of its responses must have been modified by the fact that sometimes one stimulus acted repeatedly and demanded an identical reaction (sameness); sometimes shifting from one form of response to another was required (difference); sometimes two stimuli acted at once tending to call forth opposite and incompatible reactions (contradiction); and sometimes a response which needed two or more stimuli in succession to call it forth had to be suspended, after the first stimulus was given, until the second one arrived (conditional dependence). We are not suggesting of course that anything like the *consciousness* of sameness, of difference, of contradiction, and of conditional dependence accompanied these early reactions; they may have had no psychic aspect whatever, but the point is that they must certainly have been primitive, and that

when the nervous system developed and the association of afferent impulses became possible, the afferent kinæsthetic impulses from these typical attitudes must have been associated from the beginning. As attitudes, they antedate most if not all of the emotions; they are certainly older than the differentiation of sex, far older than the instinct of imitation because they must go back to a time before those sense organs upon which imitation depends were developed; perhaps even older than the oldest roots of the fighting instinct.

We can thus in certain typical instances of relational processes conjecture a history long enough to account for the closest possible fusion of sensory excitations into combinations whose psychic accompaniment is wholly irresolvable and unitary. But not only from this point of view can we see how such fusions may have been possible. There are reasons why kinæsthetic mental processes should, for the welfare of the organism, have remained unanalyzed. The chief need, from the point of view of safety, has been the analysis of impressions received from the external world. As I have elsewhere[1] tried to show, an animal, supposing it to have a limited stock of what we may figuratively call mental energy to expend in analysis, cannot afford to withdraw that energy from the direction of its outward environment, so full of peril and ministry to needs, and turn it to the investigation and analysis of processes arising within the organism. Hence attention to kinæsthetic sensations is probably a late development, made possible very likely by the prolongation of the period of infancy, during which the organism is protected from these practical conditions which require attention and analysis to be externally directed. The mental effects of kinæsthetic afferent impulses must have long remained in a stage where attention had never been directed to them, and where they consequently had never reached the status of sensations, localized and qualitatively discriminated from their conscious background. It is not incredible that in the case of certain combinations of such impulses the psychic effects should remain permanently non-sensory, so far as introspection is concerned.

In summary, then, it may be said that introspective analysis of our experience reveals certain processes which are not to be classed as sensations, that is, which are not localizable or referable to a particular sense-organ, and the nature of whose dependence on other processes has caused the term 'relational' to be applied to them. There are two reasons why it would be desirable to show that the physiological processes underlying them are of the ordinary sensory type. First,

[1] *The Animal Mind*, p. 282.

certain sensation fusions accompany and characterize them so intimately that some psychologists have thought them actually identical for introspection with these sensational accompaniments; hence it would seem possible that whatever remains irresolvable into sensations may be simply a 'core' based on more intimately fused processes of the same nature. Secondly, the sensory nervous process is one about which we know more, it is of a less conjectural and made-to-order character, than other hypothetical cortical processes that have been suggested as a basis for the relational processes. And there are three reasons for thinking that the physiological substrate of relational processes may be a close fusion of kinæsthetic sensory impulses. First, no other class of sensory excitations, except possibly the organic, would be equally capable of accompanying excitations from all the other senses, and thus of being the basis for 'relations' between all kinds of objects; secondly, the sensations which introspection finds most closely associated with the relational processes are kinæsthetic in character, and the most important and typical relational elements are describable as 'motor attitudes'; thirdly, the closeness and permanently unanalyzable character of the fusion of afferent kinæsthetic processes required by this theory would be accounted for on the one hand by the fact that the attitudes concerned are very old in the history of living beings, and on the other hand by the consideration that attention to and analysis of the psychic processes immediately resulting from movement has been for sufficient reasons a late and imperfect development.

PSYCHOLOGICAL LITERATURE.

GEGENSTANDSTHEORIE.

Ueber die Stellung der Gegenstandstheorie im System der Wissenschaften. A. MEINONG. Leipzig, 1907. Pp. viii + 159.

Professor Meinong's latest defense of *Gegenstandstheorie* is not so wholly negative as his words at the end would imply: "Its task could be no more than to remove obstructions" (p. 149). There is much new light, and more inducement to the science in question, than he has yet given us. As he rightly says, the science is not merely a program, but an actual body of knowledge — witness the volume *Elemente der Gegenstandstheorie* (Leipzig, 1904). In the past much has been, under other titles, contributed to it, as for example in pure mathematics, grammar, logic, psychology, etc. Some hitherto unrecognized *Gegenstände* are noted in Sect. I., *Homeless Objects* — those which have up till now found no proper home in any science. Such are colors, tones, or other sense-qualities, considered for themselves, apart from the psychoses in which we apprehend them (p. 8), yet not as physical. A *gegenstandstheoretische* problem in connection with them is, do the colors arrange themselves naturally in a sphere or a hexagon? Another problem would be: is the tone-series in itself infinite or finite? This distinction of object from psychic content is not uncommon, of course, but the question is, are such 'objects' important enough in their aloofness to deserve a separate theoretic treatment in a new science? That they are, is seen when we remember their number and the character of the knowledge with which we know them. In their number is included, further, impossible objects, such as round squares, etc. A beautiful study of these follows: they are not subject to the law of contradiction, which applies only to the actual and possible (p. 16), nor are they only 'flatus vocis' for these have physical attributes alone. Again, the impossible objects are used in every indirect proof. The treatment is extremely suggestive in many ways here unmentioned, and we hope that Professor Meinong will some day give us a monograph on the impossible object. Other *Gegenstände* are the *Objektive* (p. 20), with which readers of *Ueber Annahmen* are familiar. Their characterization we anticipate from the later and fuller statement (p. 124): the *Objektiv* is to the judgment as the *Gegenstand*, say, color, is to the existent, say, the

psychical apprehension of color. Further objects are the meanings *true* and *false*, *necessary* and *contingent* (p. 25).

The second section, *The Peculiar Mode of Knowledge in Gegenstandstheorie*, takes up the second justification mentioned of the science, the fact that it gives *a priori* knowledge. *Gegenstandstheorie* is 'daseinsfreies Wissen' (p. 28), and 'Einsehen mit Verstehen' (p. 31), which are equivalent to *a priori* knowledge (pp. 33, 50, 51). The denotation of *a priori* is broader for Meinong than for most logicians, though we think he is correct. Thus he says that of two different things A and B, the judgment *A differs from B* which follows not from their existence (*Dasein*) but from their character (*Sosein*), is *a priori*. So, too, *black is not white* is *a priori*. A relation, in general, is an 'object of a higher order' than its terms and as lacking *Dasein* becomes a *Gegenstand*. A very good touch here is the counter-doctrine that *a priori* knowledge, holding of the *Sosein*, may yet apply perfectly to the *Dasein* (pp. 36, 51, 106–7). There is no such gulf between *Gegenstand* and *fact* as the 'logistic' writers, following the Kantian tradition, would make, and herein Meinong escapes those criticisms which are based upon the extreme abstractness of current exact logic.

Section 3 is a closer study of *Daseinsfreiheit*. That term does not connote non-existence (as has been suggested already) but indifference to existence or non-existence. This attribute contributes to the satisfaction of a *special theoretical interest* (p. 43), quite other than the one which would know reality for its own sake. This, we must admit, is good psychology; there are two kinds of theoretical need, one directed toward the real, the other toward the merely objective. This positive character of *Gegenstandstheorie* is defended further as follows: the judgments composing it (*e. g.*, these of pure geometry) are not negative, nor hypothetical, or approximative (p. 47), but are irreducible positive judgments. This is an excellent refutation of certain current views of the universal judgment.

Section 4, continuing the subject of section 2, is a further study of *a priority*. On the positive side *a priori* knowledge is grounded objectively and is necessary (pp. 51–2). Mathematical knowledge is wholly *a priori:* here follows (pp. 62–102) a long, difficult and complicated discussion which might well form a separate book. We subjoin but one point, though a crucial one. The parallel-axiom is not empirical but *a priori*. *Gegenstandstheorie* shows that "two intersecting parallel straight lines are always an impossible object" (p. 88). "Plane, spherical, pseudospherical, etc., geometries treat of

different *Gegenstände*" (p. 90). Each geometry is thus *a priori*. We feel a difficulty here. If plane 'parallel intersecting lines' are impossible objects, they form (as we learned, p. 14 ff.) a branch of *Gegegenstandstheorie*. And as they are about geometrical objects, why may they not form a separate geometry? But if so, that particular geometry would abolish the necessary connection between plane, parallel, straight, and non-intersecting. What kind of a necessity is it that can thus, without the intervention of new conditions, be abolished? The parallel-axiom seems to lose its *a priori* character.

The fifth section (*Defense: Logic and Gegegenstandstheorie*) is occupied with oddments, which, however, throw light on many points. First is a polemic, replying to E. Dürr's strictures and leading to the distinction of logic from the new science. Here is much subtlety. Logic deals with concept, judgment and reasoning. Concepts are 'incomplete objects,' being abstract (p. 122). So "all which in the concept may attract theoretical interest, will also pertain to the nature of the concept's object" (p. 123). Hence logic as concept-theory *contributes* to the new science, but strictly is not a part of it, as the concept is not itself a full 'object.' So too of judgment. The *Objektiv* of a judgment is a *Gegenstand*, the judgment itself is not. And of reasoning we find: "certain characteristic connections of *Objektive* . . . these it is to which logic, as the doctrine of inference, must apply," "yet it is not itself the doctrine of these connections, but it is to the latter doctrine only as to its foundation" (p. 127).

It seems to us unimportant to distinguish logic so carefully from *Gegenstandstheorie*, so long as the individual problems of each are properly worked. Still we accept with thanks the distinctions of *concept* and *Gegenstand*, of *objektiv* and *judgment;* they are indeed indispensable to future work.

The sixth and last section defines and defends the desideratum of the science. There is a distinct theoretical need here to be satisfied. But can there be found sufficient unity among so utterly different and apparently unrelated *Gegenstände* as the science must take in? We cannot tell beforehand, but if metaphysic does not despair of finding a unity behind all *realities*, surely *Gegenstandtheorie* may hope as much from its group of *a priori* knowledges (p. 135). Incidentally the empirical and *a priori* are here contrasted, the former dealing with the existent, the latter with what is indifferent to existence. It is not wise, we are told, to call all knowledge empirical, as 'radical empiricism' does, though in a sense it is true; for thus we obliterate the distinction of 'existent' and 'indifferent thereto' (p. 141). 'Psychologismus'

"consists mainly in confusion of an object with a psychosis (intellectual always) which really or presumptively apprehends it, or could do so" (p. 143), and as such is a fundamental error. On the other hand, a properly directed psychology is not excluded, but even needed; witness much of the present book, which is largely psychological. The laws of thought are here interpreted not as controlling our psychical processes but as true of *Gegenstände* (p. 147) and thus having the objective character which in general distinguishes Meinong's *a priori* from the more usual Kantian *a priori* — much to the credit, we believe, of the former.

Altogether the book will be welcomed by all who appreciate the importance of Professor Meinong's recent labors. It is, however, we think, a pity that so clear and fundamental a thinker should have so forbidding a style; forbidding not so much from lack of elegance — of course a minor matter to the scientific investigator — as from lack of clearness and distinctiveness in the stages of the argument.

W. H. SHELDON.

DARTMOUTH COLLEGE.

THOUGHT PROCESSES.

Die psychologische Beobachtung und experimentelle Untersüchung von Denkvorgängen. E. v. ASTER. Zeitschr. für Psychologie, XLIX., 56–107.

Taking the pioneer work of Marbe in the experimental investigation of the process of judgment as his starting point, Aster subjects the results of experimental investigations of the thought process to a critical discussion. Marbe's quest for a characteristic immediate fact of experience which might be identified as the judgment process *per se* was doomed to failure; all that his experimental material indicated was an unconscious disposition or attitude (Bewusstseinslage), which was not immediately experienced the moment a judgment was made. From Marbe's beginning up to the present the indications have pointed in the direction of an immediately experienced thought process differing fundamentally from sensation and presentation. In Bühler's work the conclusions indicate the existence of immediately observed experiences which can only be described as 'consciousness of,' 'knowledge about,' 'consciousness that,' etc. These are distinguished from unconscious dispositions as immediate facts of experience. He thinks that the reason why Marbe's subjects failed to find such facts was because the task which they were given was so simple that it did not arouse a proper thought process. The specific conscious content just

mentioned Bühler considers to be incapable of further analysis, and to contain the characteristic properties of all cognitive processes.

Aster makes a comprehensive examination of the material gathered by Bühler, Messer, Ach and others from which the above conclusions as to the nature of the thought process were drawn. First in reference to the conscious experience of meaning, aside from any related presentational content; when a reagent says that he does not understand a word until after he has heard the sound one is justified in assuming a process in which the meaning develops. There is no justification, however, for saying that the process is present in pure form when a word appears which is familiar, but for which I have no presentational meaning. A Latin word may appear; it is familiar, but I have long forgotten the meaning; there is no abstract meaning process in this case. 'Consciousness of' something, the meaning does not come explicitly to consciousness as a particular content in such cases. I am asked: Do you understand Hebrew? I answer yes, and then find that I do not, or that I do. In either case there is implied the assertion of the possibility of relating definite presentations to the word Hebrew, there is an unconscious 'gefühlsbetonte Bewusstseinslage.' Taking such material as the above, Aster contends that one is not forced to the conclusion that there exist, as explicit facts of consciousness, such items as 'consciousness of,' 'knowledge about,' etc. It is pointed out that utterances of Bühler's reagents are expressions of the processes experienced; they are not descriptions of those processes in consciousness. Thus to reach the results presented by the experimenter those utterances of the reagents are not themselves conclusive, the results are the interpretation of the material. Aster, as indicated above, considers that the material is only conclusive in respect to the existence of 'gefühlsbetonte Bewusstseinslage.'

In an added paragraph Aster contends against Orth that these Bewusstseinslagen attitudes of consciousness are closely akin to feelings (lust-unlust). Like feelings they are not self-dependent; they are never present in consciousness unaccompanied by presentational content of some kind. "They stand as peculiar groups of dependent experiences over against the independent analyzable foundation of conscious life, which is made up of sensation and presentation content." Aster's article is a clear and forcible discussion which brings out admirably the fundamental points which have been developed in the recent experimental investigations of the thought process.

F. S. WRINCH.

UNIVERSITY OF CALIFORNIA.

Bemerkungen zu meinen 'Experimentell-psychologischen Untersuchungen über das Denken.' AUGUST MESSER. Archiv f. d. ges. Psychologie, X., 409–428.

The purpose of this article is to defend the method of procedure and conclusions of his experimental investigation of the thought process from criticisms of Meumann and Bühler. Meumann contended that Messer's results showed the effect of confusion on the part of his reagents, arising from the nature of the task which was required of them by the experimenter. In an association experiment Messer required his reagents to first read and understand a printed word exposed to their view, and thus react as quickly as possible to the first word which entered consciousness. In Meumann's view the confusion arises from a division of the attention between (1) the exactness with which the meaning of the word was to be apprehended and (2) the speed of the reaction. Messer agrees that such a double task as Meumann speaks of would be fatal to the end at which the experiment was aimed, but shows that in his work due emphasis was laid either upon the one phase or the other of the task, so that confusion was impossible.

He agrees with Bühler that his description of the process of judgment as distinguished from the simple associative relation is not sufficiently definite. His revised statement makes the judgment process actively assert a complete and definite relation between the stimulus and reaction presentations; a relation merely contemplated as possible would not be admitted under the category of judgment. In association the relation between the two presentations appears objectively present, my attention is directed to it, but it is not of my making.

Messer agrees with Bühler that the processes of consciousness may be divided into two general classes, (1) sensations and their reproductions, which are concrete (anschaulich), (2) thoughts which are (unanschaulich) abstract. He finds that the meaning even of words and sentences may be present in abstract form (unanschaulich). He further shows that Bühler's general divisions, 'direct' and 'indirect' meaning, do not cover what he comprehends under the general divisions, 'gegenständliches' and 'begriffliches' thinking. Under the former Messer includes those processes of thought in which the object as it enters consciousness is complete and concrete. In the latter he places those cases in which the process from stimulus to reaction runs more smoothly, is more superficial and mechanical, the reaction time is shorter and more like a simple verbal reaction, and the meaning as a rule is not clearly distinguished from the word.

F. S. WRINCH.

Ueber die Abstraktion der Gleichheit. A. A. GRÜNBAUM. Archiv f. d. ges. Psychologie, 1908, XII., 340–478.

The experimental work reported under this title is an attempt to approach by modern methods the old metaphysical problem of abstract ideas. An essential element of the process, known to logicians as abstraction, is the perception of identity between one or more elements of two complex groups, the fixation of these elements in mind and the neglect of the surrounding elements, which are not common to the two groups. This perception of identity was the object of research in Dr. Grünbaum's dissertation.

The method he used is rather new, if not entirely original. It consisted in exposing two groups of simple but unfamiliar figures. One of the figures was common to each group and the others were all different. The subject had a two-fold task to perform; (*a*) the primary task: to find and reproduce by drawing the common element. (*b*) The secondary task: to note, so as to be able to recognize, the other figure when shown the groups after the experiment was over.

The process by which the primary task is performed admitted of division into eight different classes. Some of these divisions represent totally different methods of procedure, others are probably stages in one and the same method. The author, however, does not bring out this distinction. The study of some of these methods (*e. g.*, the method of comparison with its various stages of accentuation of the common element) will throw no little light on the psychology of abstraction. The intuitive method would have appeared less mysterious had Dr. Grünbaum pushed the inquiry a little further and taken into consideration our subconscious or unanalyzed mental contents.

In the primary task it is interesting to note the way in which the subject falls short of perfection in reproducing the common element. (1) Instead of the perfect and complete form, he will often give one that is schematically correct. (2) The subject will often draw a part of the figure and will know that something is lacking but will be unable to supply it. (3) The correct form will be changed but still remain recognizable. The most interesting case of this kind is what Dr. Grünbaum has called 'mirror-drawing'; the figure is drawn as if from its reflection in a mirror.

The success with which the primary task is accomplished decreases with the increasing number of figures in the groups. But the rate of decrease is not constant. It reaches a maximum in passing from four to five figures in a group and then rapidly declines.

The secondary task consisted in the recognition of all the figures

that could be remembered after drawing the common element. As the number of figures in each group increases, the subject remembers an ever-increasing number of figures. But when you compare the number of figures remembered with the entire number exposed, the fraction remembered decreases with increasing number of figures in each group.

The author compares the fulfillment of the secondary task in recognition by the method of succession with, and that without accentuation of the figure. It would appear that the accentuation or the becoming prominent of one figure during the progress of perceiving identity lessens the number of figures remembered over and above the common element. From this it would seem that with the accentuation of one figure, the negative process of abstraction from the surrounding figures is already begun. The evidence shows that the secondary task is fulfilled better when the primary task is not accomplished. In other words, the perception of the common element tends to obliterate the surrounding figures.

From the experiments, it would seem that the process of abstraction is brought about by an apperceptive accentuation and separation of the common element. On the other hand, the surrounding figures are forced into the background and lose something of their conscious value.

THOMAS V. MOORE.

ST. THOMAS COLLEGE, D. C.

Etude sur la réflexion. ETIENNE MAIGRE. Année psychologique, 1908, 380–389.

M. Maigre speaks in this article of two kinds of reflection, (*a*) one in which the subject fixes his mind voluntarily or automatically, or even in spite of his will upon a special image, or a fragment of an image or idea; (*b*) the other in which the mind makes a special effort toward some definite end — tries to get at the bottom of a problem.

On the second form of reflection, M. Maigre has made some experiments. He assigned to a number of young pupils the task of solving geometric problems, and while he appeared to be seeking the solution and working at the problems himself, he was in reality observing them and their methods. As a result of this observation and study he analyzes the process of reflection in this manner:

The first step is the adoption of some point of departure. This leads to a train of associations. These may or may not help towards the solution of the problem. If so they are followed up, if not one returns to his starting point and goes on as before.

If this is so, one may ask: (*a*) How can one stop the train of associations after he sees they are no longer useful? (*b*) How does one return to the first idea? (*c*) How is it that one does not follow the identical train of ideas that he pursued before?

The first and last processes depend upon the change in the emotional state of the subject. The second is accomplished by a voluntary act.

This analysis — supposing it to be correct — cannot in any way be directly connected with the experiment reported.

THOMAS V. MOORE.

Judgment and Apprehension. HELEN WODEHOUSE. Mind, 1908, N. S., XVII., 359–369.

The purport of this article is briefly stated by the authoress in the opening sentence: "I wish to set forth such arguments as most appeal to me in support of the thesis that judgment and apprehension are identical." This is done by an attempt to level down our concept of judgment to that of apprehension. The attempt is executed by pointing to the cloudiness which hangs over the dividing line between judgment and apprehension, and by a criticism of the arguments advanced by Stout and Brentano in favor of the traditional distinction.

THOMAS V. MOORE.

REASONING.

Experimentelle Untersuchungen über einfache Schlussprozesse. G. STÖRRING. Archiv f. d. ges. Psychologie, 1908, XI., 1–127.

Judgments involving relations of spatial and temporal order, order of magnitude, and equality, as well as judgments of subsumption and attribute, were the subject of this 'experimental' study. Pairs of premises were exposed on cards before the subject and he was required to draw an inference of which he was certain, and then to describe, as far as it was possible for him to recall them, his mental operations during the process. The terms in the premises were always letters of the alphabet. The reaction times were taken, but the subjects (following a caution of Meumann's) were assured that speed was not a consideration.

Lange's contention that inferences always involve spatial representations was the starting point, and then the question whether the inference arises or not from a simple synthesis of the premises. On these two points a large amount of original and significant observation is submitted; but there is no coördination of this material nor any statement of its general bearings, so that the reader must glean for

himself what little grain of comfort there may be for one or the other of the mooted theories. Of the judgments reported, many seem to have been formed without any consciousness of imagery, but the conditions are not controlled in such a way as to prove that there were no images involved. On the other hand the very simplicity of the material sufficiently accounts for many of the judgments which were simply read off without conscious identification of the middle terms or awareness of the full relation between the premises, and in some cases without even a full sense of the meaning of the single premises.

WARNER BROWN.

UNIVERSITY OF CALIFORNIA.

A Preliminary Study of the Psychology of Reasoning. WILLIS L. GARD. Amer. Journal of Psychol., 1907, XVIII., 490–504.

Does the syllogism correctly express the psychic process involved in reasoning? This is the question which Gard has submitted to an experimental test in the present investigation. The material for the tests consisted of examples in division, multiplication, and addition, in which some of the figures were given while others were omitted and their places taken by x. The task of the subjects was to supply the missing figures and, at the same time, to try to ascertain how they discovered them. The result shows three general methods of solving the problems. First, by direct substitution, *i. e.*, the ability to perceive the missing figures as soon as the data are apperceived. Second, by the immediate perception of a general principle involved. Third, by trial and error.

The author concludes from his study that the reasoning involved in such problems does not take the form of the syllogism. While in some cases the reasoning employed was capable of restatement in syllogistic terms, this logical process was rarely or never followed, and usually was not even used to test the correctness of the conclusion. The processes, he says, are those of apperception and association 'working under the special conditions of attention to the matter in hand.' Habit played an important part in determining the method of attack, and the reasoning often seemed to be an obscure insight or guess with an appeal to the method of trial and error. Some of the subjects were conscious of a vague background which guided the associations. This 'mental set' the author thinks is determined, on the one hand, by the problem as stated, and, on the other hand, by the general knowledge of numerical relations and interest in the solution. He adds, however, that this still leaves much that is uncertain.

LULA ELIZABETH GORDON.

WASHINGTON UNIVERSITY, ST. LOUIS.

REPORTS AND DISCUSSION.

THE SIXTH INTERNATIONAL CONGRESS OF PSYCHOLOGY.

The sixth international congress of psychology was held at Geneva, Switzerland, August 3–7, with about 550 members in attendance. The sessions were opened by President Flournoy, who traced the history of the congresses since the first held at Paris twenty years ago, and explained the reasons for the plan adopted by this congress to hold the discussion to a limited number of topics, reports on which had been prepared on request by various investigators of these several lines of work. This innovation proved, on the whole, a very happy one, and although individual communications were not debarred, they formed for the most part a supplementation to the discussion of the topics chosen by the committee for special debate. Another innovation which proved itself valuable was the preparation in printed form of each of the general reports and many of the special contributions, so that the members were enabled to read them in advance, and thus be prepared for the discussion. In view of the various languages sanctioned by the congress, this was a thing of the greatest practical importance. It is to be hoped, however, that at the next congress the reporters will follow the excellent example set by Professor Külpe who refrained from reading his report and at once invited the discussion of it. A third innovation was the sanction of Esperanto as an official language. Several brief reports were made in this tongue to the end of advancing the claims of an international language as the proper medium of discussion for such a gathering. It seemed doubtful, however, judging from the opinions expressed, if the world of science is as yet ready to adopt such an ideal and artificial mode of expression for its reports. As the possible basis for an international terminology the language found rather more favor.

The Psychology of Religion was the first topic. It was introduced by Höffding (Copenhagen) who maintained that the religious experience was in its essence conditioned by a sense of limitation and dependence which found its expression in a demand for the continuance of that which we consider to be of value. Religious values thus became the keynote to his theory, and the study and systematization of these values was held to be the aim of the psychology of religion. The second speaker, Leuba (Bryn Mawr) took issue with Höffding in his position that the essence of religion was a sense of value. Leuba traced the origin back to primitive life before values have been

clearly apprehended, and considered the conception and belief in unseen forces to constitute the real essence of the religious experience. Religion was broadly defined as that portion of the struggle for existence which is made with the aid of certain spiritual forces, an active belief in such forces being regarded as the criterion of the religious experience. The discussion on this topic waged steadily in separate sittings during the remainder of the congress. Many more or less kindred topics including recent experimentation on spiritism were introduced, but it can scarcely be said that any very definite conclusions were arrived at. It is perhaps significant that a motion to continue this topic on the program of the next congress was voted down by a fair majority.

The second topic to be introduced was that of the Subconscious. The first to report was Dessoir (Berlin), who presented many bits of evidence to indicate the incalculable fullness of consciousness, and the importance of conscious 'fringes' in explaining such phenomena. The division of attention with simultaneous direction on different objects appeared to the reporter possible, and his conclusion was that the most important feature of the subconscious seemed not to be so much a peculiar quality or composition of content as the unique manner in which the content is combined. Janet (Paris) was unfortunately absent, but his report, which was available, was concerned with upholding the rather narrow use of the term introduced by him for referring to the peculiar inability of hysterics to note certain changes or omissions in their consciousness, although it is possible to prove that these factors still exist and exercise an effect upon their total mental state. As to any other form of the subconscious, Janet declines to accept it. The contribution of Morton Prince (Tufts) consisted first in a critique of the various meanings attaching to the term. Following came a discussion of the evidence which led the speaker to accept as highly probable (1) active co-conscious processes — as against the interpretation by rapid oscillation — (2) active but unconscious cerebration, and (3) brain dispositions in the form of unconscious, passive physical residua. The rather uncertain character of the entire discussion of this topic indicated, among other things, inadequate criteria for introspective results. It might perhaps be suggested that from the point of view of the new psychology of thought processes it may be possible to understand the splitting of consciousness and the attendant phenomena of depersonalization in much simpler terms than when one is confined to the older usage of more or less concrete and inflexible ideas.

This discussion was followed by an interesting contribution by Alrutz (Upsala) describing some experiments on the transference of nervous into an external expression of physical energy. Under the influence of strong suggestion exerted on rather sensitive or 'labile' persons, he was able to obtain with the aid of a specially constructed apparatus the registration of an increase in physical force too great to be accounted for by any direct physical means. The method used appeared to be simple and ingenious, and a more complete testing of it might be expected to demonstrate whether or not *telekinesis* is to be admitted to the realm of scientific fact. The program of the first day's session was completed with a very interesting exhibition of rhythmic gymnastics by the pupils of Jaques-Delcroze (Geneva). The apparent ease and grace with which his pupils, even at six to ten years of age, were able to express by step and gesture the most varying rhythms, including such irregular ones as 5 and 7, was most instructive.

The second day's session was opened by Decroly (Brussels) with a report on the classification of backward children. The classification proposed was in brief as follows: — I., Irregularities due to intrinsic causes. II., Irregularities due to extrinsic causes — that is, those which can be traced to the influence of the child's environment. The discussion hinged largely on the elaboration of the first of these classes, which was divided into two parts: (1) irregularities of the vegetative functions, and (2) irregularities of relational functions. Under (1) was distinguished (*a*) physical deformity and (*b*) disturbances of the nutritive organs. Under (2) came irregularities of (*a*) the senses, (*b*) movement, (*c*) mentality and (*d*) affective life. Each of these was subjected to detailed consideration. Ferrari (Bologna), who followed, proposed that the matter of classification be referred to an international commission appointed by the congress. The discussion was then carried forward by Persigout (La Teste de Buch), De Sanctis (Rome) and Schuyten (Antwerp). The latter called attention to a method used by him with success, in accordance with which not alone sub-normal, but also hyper-normal conditions were taken into account.

Next in order came the topic of Tropisms introduced by Loeb (California), who maintained that a scientific analysis of psychical phenomena must be referred to physico-chemical laws. In order to understand the behavior of animals we must look aside from teleological constructions and consider the tropisms and other primitive phenomena, not as existing in the interest of the animal, but at most as not opposed to its interests. Tropisms are not the only elements with which we have to deal. Differential sensitivity and associative memory

are also factors of prime importance. Jennings's attack on the theory of tropisms was subjected to criticism and in conclusion the importance of a physico-chemical interpretation of behavior for the psychiatrist and also for the ethicist was suggested. Bohn (Paris) followed with an expression of views which did not vary greatly from those of Loeb. Two kinds of activity of the two symmetrical sides of the body were distinguished as referable to qualitative and quantitative differences. Only the last, in his opinion, constitutes the tropisms. The former, consisting in associative memory, vital rhythms and differential sensitivity, were considered to be the cause of perturbations from the direct and invariable mechanical activity which the tropisms would otherwise occasion. Jennings (Johns Hopkins) was not present, but his report was available and indicated his belief that the tropism is a term for denoting "reactions in which orientation is a prominent feature," and that "such reactions form a part (a very minor part . . .) of the behavior of many organisms." A considerable debate was then entered upon which lasted through several special sectional meetings and waged principally about the subject of animal psychology. The rather narrow view of Loeb on the proper scientific procedure of the psychologist was, naturally enough, attacked. Loeb was forced to admit that the method of investigation which he has used with so much success on the lower forms of animal life, was not yet far enough advanced to be clearly applicable to the higher and more complex forms of mental activity. He thought, however, that the time might come when this ideal would be realized. Asher (Bern) expressed the opinion that a scientific animal psychology was, strictly speaking, an impossibility, since in the case of animals we are unable to deal directly with the phenomena of consciousness: that animal behavior, therefore, and human psychology remain two different problems which should not be confused. He attacked especially the treatment of animal behavior after the analogy of human experience.

The problem of the Standardization of Colors was discussed by Nagel (Rostock) and Asher (Bern). The former was rather sceptical in his views. The latter, however, was more hopeful and suggested that four liquids of the colors red, yellow, green and blue might be found, the chemical and spectroscopic analyses of which should be definitely ascertained and the liquids used as dyeing material for a standard set of colored papers. Thiery (Louvain) also presented a method of classification based on three fundamentals which he illustrated by colored figures of his own devising. It was then proposed that an international commission to include an organic chemist

and a physicist should be appointed to consider the feasibility of various methods of standardization and to make a report at the next congress.

The question of establishing a standard terminology for psychology was introduced by Baldwin (Baltimore) who reported briefly on certain general rules which had been found useful in the compilation of his *Dictionary*. The principal points made were in favor of the retention of words already in use, and the construction of new terms, preferably from Greek and Latin roots, to cover new conceptions not adequately named. In the several languages terms should be rendered, so far as possible, by analogous roots, and in no case should a term peculiar to one language or writer be adapted to a different use in another language. In adopting new terms their availability in other languages should be a prime consideration. The speaker then proposed that an international commission be appointed to consider this whole matter and report at the next congress. The report of Claparède (Geneva) on the same topic was much more detailed, especially with reference to the rendering of equivalent meanings for German and French terms. Certain general symbols were also proposed. In view of Baldwin's motion, which Claparède seconded, this report was not read. De Saussure (Geneva) spoke in Esperanto of the work already accomplished by the *Scienca Asocio Esperantista* towards an international scientific terminology, and urged coöperation along this line. At a later session Courtier (Paris) reported on his system of symbols. These are of Latin derivation, and can be expressed in algebraic form to convey the meaning of a large number of psychological terms and processes.

The third day's session was opened with an interesting contribution by Thauzies (Perigueux) on the capacity of carrier pigeons to orient at a distance. As a result of numerous observations extending through years of experience with these birds, the speaker had reached the conclusion that the phenomenon in question could not be explained in terms of sight and memory, a sense for its attitude — *i. e.*, the assumption of a constant orientation — or a specific 'sixth' sense for direction. On the other hand, a study of the meteorological conditions prevailing at the times of various successful and unsuccessful flights seemed to indicate a direct sensitivity for magnetic forces. Among the data noted was the observation that young pigeons never fly voluntarily to the west and rarely to the south. It is with much more difficulty that mature birds fly from north to south and from east to west, than from south to north and west to east. In a report on

the position of the body and its members with reference to the vertical, Bourdon (Rennes) gave his reasons, experimental and theoretical, for concluding that a static sense referable to the semi-circular canals does not exist. Experiments show that accurate judgments are always conditioned by innervation of the muscles, and the most that can be assumed for the semi-circular canals is that they are the seat of motor nerves. Disturbances of the organ may thus occasion disturbances in muscular activity which in turn condition peculiarities of orientation. It is interesting to note in this connection that Loeb in his paper reported a similar result from experimentation on lower animals. The removal of the otoliths, he found, did not cause the animal to lose its capacity for orientation provided the nerve was not destroyed. This is to him, of course, proof for a general geotropic function.

The fourth day's session had for its special topic Feeling. The first report was made by Sollier (Paris) who argued in favor of the reintroduction of the term *cœnesthesis* as applicable to the unique feeling of bodily existence and functioning. After the various meanings which may be attached to the term had been differentiated and evaluated, the conclusion was reached that cœnesthesis is primarily a feeling, not a sensation, and furthermore, with reference to cases of disturbed or altered personality, that it is a quality which attaches to perception, not to sensation. It is that feeling of association between our acts, past and present, which constitutes our personality, and may be further described as a sensitivity proper to the brain itself whereby we obtain knowledge of individual activity and personality. In the discussion which followed Patini (Naples) expressed the opinion that cœnesthesis might be the basis for the ego without being dependent for its existence on the sense of personality, while Prince (Boston) described a case of multiple personality in which one of the manifestations indicated marked loss of cœnesthesis without loss of ego.

Külpe (Bonn) offered the second report. It was divided into five sections. The first discussed the criteria of feeling, which were declared to be as follows: elementary conscious contents of pleasantness and unpleasantness, distinguishable from sensations in that they are in no specific manner dependent on sense organs and leave no ideational residua after them; from images in that they can neither be reproduced or associated, and from thoughts in that they constitute neither knowledge about things nor things as known. The following criteria were then discussed and rejected as possessing no characteristic or universal validity: — (1) subjectivity, (2) non-localization, (3) polarity, (4) unity, (5) inability to focus the attention upon them, (6) imma-

nence, (7) dependency on other conscious factors. A more positive expression of the criteria discovers a *universality*, in accordance with which nothing can impress us which is not capable of producing pleasure or displeasure, and a *reality*, on the basis of which feelings always possess their same real character whether referring to the past, present or future, and whether occasioned by sensation, image, thought or function. The second section described the kinds of feelings as in quality but pleasant and unpleasant, but as existing *singly* or as *common* feelings, *active* or *passive*, '*shock*' — coming and going quickly, or *temperamental* — coming and going slowly. In opposition to the possibility of qualitative differences of pleasantness and unpleasantness were noted among other points the following: — (1) the ability to compare feelings of pleasantness and unpleasantness although occasioned in different ways; (2) the possibility of unlimited compensation; (3) the irrelevancy of the accompanying feelings in the specific comparison of sensations, images and thoughts; (4) the inherent improbability of a larger manifold as indicated by the difficulty of making such a classification; (5) the fact of feeling irradiation from one impression to another. The third section considered the methods for investigating the feelings, and the fourth section the results of investigation. The last section dealt with the theories of feeling. These were divided into two classes: — (1) heterogenetic, in which feelings are reduced to other psychical contents, sensory or intellectual; (2) autogenetic, in which feelings constitute a unique class of elements to be explained physiologically, psychologically or psychophysically. The last of these modes of explanation was considered to be the most plausible, although it is impossible at the present time to carry it out in detail.

The report was presented without being read, and the discussion immediately entered upon. Bovet (Neuchatel) referred to the difficulty of cataloging under the simple categories of pleasantness and unpleasantness all the nuances of feeling which introspective results reveal. The reporter responded that introspective results could hardly be considered as normative for this matter, and that complex states described as feelings were often attributable in the main to organic and kinesthetic sensations with or without the addition of pleasantness and unpleasantness. Pikler (Buda Pesth) attacked Külpe's criterion of inability to reproduce feelings, and remarked that it was equally impossible to reproduce an affect such as pride. Pleasantness and unpleasantness were regarded as elements, but not because of Külpe's criteria. The speaker then proceeded to outline his own mechanical

theory in accordance with which pleasantness and unpleasantness correspond to the quantity of the transformation of energy in the body, whereas consciousness in general corresponds to the quantity of work done by the organism. In his response Külpe maintained that the reproduction of certain factors, such as the affect mentioned, which do not possess the characteristic of invariable reality was quite possible, and that real feeling may very well attach to such reproductions without itself being subject to the conditions of reproduction. As for Pikler's general conception of feelings as the determining motives for all our acts, this was rejected. Michotte (Louvain) questioned the reporter concerning the distinction of feeling and function. Response was made that functions possess reality, but not universality. If by content of consciousness we mean discernible objects, then functions cannot be so discerned during their process in consciousness, but only by reflection after the process is complete. Pleasantness and unpleasantness, on the other hand, can be discerned as we experience them. The session was brought to a close by a paper presented by Ogden (Tennessee) on the relation of the esthetic to general feeling experience. From a functional point of view the feelings of pleasantness and unpleasantness, recognition, economic activity — as the basis of the so-called esthetic feelings, and also for similar manifestations of the lower senses — interest and emotion were considered in relation to their bearing on the esthetic attitude, and the latter was defined as a feeling characterized by interest and the absence of dominant motives for adjustment, but essentially independent of the other factors noted.

The principal report of the afternoon was furnished by Lipmann (Berlin) on the evaluation of results obtained with the 'Aussage' method of experimentation. The results were first subjected to certain general criticisms, principally with reference to individual type differences. If A answers 8 out of 10 questions correctly, and B but 5, it does not necessarily follow that A is a more capable reporter than B, because A may be possessed of an inherent capacity for answering the sort of questions asked. Certain formulæ were then described as applicable in evaluating the results of both simple and complex estimations.

The fifth session was opened by Mlle. Ioteyko (Brussels) with a report on the Methodology of Pedagogical Psychology, which was largely devoted to the presentation of ideas towards a quantitative psychology. On the basis of reaction curves of one sort and another, it was proposed that by discovering the equation for these curves one secured as well the law governing the evolution of the phenomena

which they expressed. A careful examination of the parameters of such curves reveals precisely the individual's isolated faculties. We should therefore do well to apply this method to the child and study each parameter separately as a most important supplementation to the synthetic study of the child in its natural condition of complexity. The paper occasioned a lively discussion. The principal objection raised called attention to the practical impossibility of treating a large number of children after this detailed fashion. Among the papers which followed may be noted one by Frau Hösch-Ernst (Munich) describing a musical prodigy possessing unusual attainments in all normal directions, and one by Meyer (Missouri) reporting the results of his modification of Cattell's method of grading as introduced into the University of Missouri.

Apart from the general sessions which have been here described, many sectional meetings were held to give place for individual communications and unfinished discussions.

At the closing session an attempt was made to limit the discussion at future congresses to psychologists whose standing could in some way be vouched for. The movement failed of support. It was recommended that the psychology of the thought process should be a special topic for discussion at the next congress. As has already been reported in the press, the next congress will be held four years hence in America with William James for honorary president, J. M. Baldwin for president, E. B. Titchener and J. McK. Cattell for vice-presidents, and J. B. Watson for secretary.

It is the opinion of many that the greatest benefit which results from such a gathering as this is due to the opportunity which is afforded for the investigators of a science to come into personal contact with one another. In this respect the meeting at Geneva was quite exemplary, and no account of its proceedings can be complete without a reference to the thoroughly delightful entertainments which were furnished the members by the families Flournoy, Claparède and Cellerier, as well as at the official banquet which was tendered by the state and city.

R. M. OGDEN.

UNIVERSITY OF TENNESSEE.

TITCHENER ON HELMHOLTZ'S EXPLANATION OF COMBINATION TONES.

"Helmholtz himself explained combinational tones as due to the movements of the drum-skin and ossicles. Attempts have since been made to derive them from the vibration of the basilar fibers; but re-

cent investigation seems to show, pretty conclusively, that Helmholtz was right, and that these tones take their physical origin in the middle ear.'[1]

One is surprised to find such results of 'recent investigations' in this admirable new book from the pen of Professor Titchener. 'That these tones take their physical origin in the middle ear,' is just what recent investigations, so far as the writer is aware, do *not* show. If there is any part of Helmholtz's theory that has not stood the test it is just this part. Unfortunately, Professor Titchener cites no literature on these recent investigations.

Helmholtz, as is well known, derived combination tones (1) from the unsymmetrical vibrations of the tympanum, and (2) from the peculiar action of the ossicles. This latter condition he emphasized most. To quote: "But a more important circumstance, as it appears to me, when the tones are powerful, is the loose formation of the joint between the hammer and anvil. If the handle of the hammer is driven inwards by the drum-skin, the anvil and stirrup must follow the motion unconditionally. But this is not the case for the subsequent outward motion of the handle of the hammer, during which the teeth of the two ossicles need not catch each other. In this case the ossicles may *click*."[2] This clicking, he supposes, produces a tone sensation when sufficiently rapid.

Dennert, as early as 1887, reported observations which seem to the writer to overthrow completely this explanation of Helmholtz's.[3] He found individuals who had lost the tympanic membrane and the first two ossicles from both ears, and who nevertheless heard the 'subjective' combination tones in question. A similar case was recently studied by Mr. Bingham and the writer.[4] Our subject heard readily both the *first* and the *second* combination tone from tuning forks. These observations, of course, do not *prove* that the tympanic membrane and the ossicles *cannot* produce combination tones as Helmholtz supposed. They show, however, that Helmholtz's explanation is incomplete and for the most part useless; that it certainly does not touch the most important cause of combination tones.

Helmholtz's mathematical explanation[5] of the effect of asymmetrical vibrations can well have other applications than that which he made

[1] E. B. Titchener, *A Text-book of Psychology*, Part I., 1909, p. 112.

[2] *Sensations of Tone*, p. 158.

[3] *Arch. f. Ohrenheilk.*, XXIV., 1887.

[4] W. D. Bingham, 'Rôle of the Tympanic Mechanism in Audition,' PSYCHOL. REV., XIV., 1907, 229 ff.

[5] *Sensations of Tone*, Appendix XII., p. 412.

of it. The writer has suggested a modification of the Helmholtzian theory of the origin of combination tones which aims to avoid the objections which are fatal to the drum-ossicles explanation, and which has certain other advantages.[1]

JOSEPH PETERSON

BRIGHAM YOUNG UNIVERSITY,
PROVO, UTAH.

BOOKS RECEIVED FROM OCTOBER 5 TO NOVEMBER 5.

J. S. Mill's Theory of Inductive Logic. GUY ALLAN TAWNEY. In two parts. (Studies, Univ. of Cincinnati.) Cincinnati, Univ. Press, 1909. Pp. 40 and 55.

La Educacion Costarricense. CARLOS GAGINI, Director. Monthly review. Vol. I, No. 2, Oct. 1909.

Rapport sur la terminologie psychologique. ED. CLAPARÈDE. (Extr. des C. R. du Congrès.) Geneva, 1909. Pp. 14.

The Child and His Religion. GEORGE E. DAWSON. Chicago, Univ. of Chicago Press, 1909. Pp. 124. 82 cents.

The Autobiography — A Critical and Comparative Study. ANNA ROBESON BURR. Boston, Houghton, Mifflin, 1909. Pp. viii + 451. $2.00.

Sociology. JAMES QUAYLE DEALEY. New York, Silver, Burdett and Co., 1909. Pp. 405. $1.50.

Habit Formation. STUART H. ROWE. New York, Longmans, Green, 1909. Pp. ix + 308. $1.50.

The Distribution and Functions of Mental Imagery. GEORGE HERBERT BETTS. New York, Teachers College, Columbia University, 1909. Pp. 99.

Die Bedeutung der Tropismen für die Psychologie. JACQUES LOEB. Leipzig, Barth, 1909. Pp. 51. 1 Mark.

Aesthetics. KATE GORDON. New York, Holt, 1909. Pp. v + 315.

The Relative Standing of Pupils in the High Schools and in the University. WALTER FENNO DEARBORN. Madison (Wisc.), Publ. by the University, 1909. Pp. 44.

Les Idées Modernes sur les Enfants. ALFRED BINET. Paris, Flammarion, 1909. Pp. 346. 3 fr. 50.

Imitazione. G. PISTOLESI. Turin, Bocca, 1910. Pp. 190. L. 3.

[1] 'Combination Tones and Other Related Auditory Phenomena,' *Monograph No. 39*, PSYCHOL. REV., 1908. See especially pp. 103–106.

Naturwissenschaft und Monismus. PAUL VOLKMANN. Leipzig, Teubner, 1909. Pp. 38. 1 Mk.

Les sentiments esthétiques. CHARLES LALO. Paris, Alcan, 1909. Pp. 278. 5 fr.

Le mensonge. G. L. DUPRAT. Paris, Alcan, 1909. Pp. 208. 2 fr. 50.

Traité International de Psychologie Pathologique. Tome I°, Psychopathologie Générale. A. MARIE, directeur. Paris, Alcan, 1909. Pp. viii + 1028. 25 fr.

NOTES AND NEWS.

WE have received the preliminary announcement of a new bibliographical annual, *Die Philosophie der Gegenwart.* It will contain one or two discussions of very general questions, followed by a classified list of the literature for the year in all branches of philosophy, including psychology; this list will contain brief summaries of each article or publication, and references to reviews of each in all leading philosophical periodicals. The literature will be indexed also. Volume I. will embrace the literature of 1908. Editor, Dr. Arnold Ruge, Heidelberg (Weiss'sche Univ.-Buchhandlung, publishers).

THE eighteenth annual meeting of the American Psychological Association will be held in Boston and Cambridge during Convocation Week in conjunction with the Society of Naturalists and the American Association for the Advancement of Science. The sessions are scheduled for Wednesday, Thursday and Friday, December 29, 30 and 31.

HELEN DODD COOK, B.A., M.A. (Wellesley), Ph.D. (Würzburg, 1909), has been appointed instructor in psychology at Wellesley College.

PROFESSOR H. N. GARDINER, of Smith College, is spending the year in Europe on leave of absence.

MR. W. D. FURRY has been appointed instructor of philosophy in the Johns Hopkins University.